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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/721,288

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Chung-Hung Lin

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EXAMINER

OWENS, BETH E

ART UNIT

PAPER NUMBER

2824

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/721,288

**Applicant(s)**

LIN ET AL.

**Examiner**

Beth E. Owens

**Art Unit**

2824

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-18 is/are rejected.
- 7) ☒ Claim(s) 1-10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>11262003</u> . | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### *Specification*

1. The Specification is replete with spelling and grammatical errors too numerous to mention. Careful revision of the Specification is kindly requested.

### *Claim Objections*

2. The following Claims are objected to because of the following informalities:

Claim 1, line 9: please insert --being-- before “fully”.

Claim 1, line 11: please replace the second use of “the” with --a--.

Claim 1, line 12: please replace the second use of “the” with --a--.

Claim 3, line 1: please replace “an” with --a--.

Claim 6, line 1: please replace “chip attaching” with --chip-attaching--.

Claim 7, line 1: please replace “formed” with --applied--.

Claim 8, line 2: please replace “with the” with --to a--.

Claim 9, line 2: please replace “with the” with --to an--.

Claim 11, line 6: please replace “is” with --being--.

Claim 11, line 7: please delete “being”.

Claim 11, line 8: please insert --to-- after “adhere”.

Claim 11, line 8: please replace “and” with --with--.

Claim 11, line 9: please insert --being-- after “without”.

Claim 11, line 10: please replace "the chip and the substrate" with --the attached chip to the substrate--.

Claim 11, line 11: please replace the second use of "the" with --a--.

Claim 11, line 12: please replace the second use of "the" with --a--.

Claim 11, line 13: please insert --to-- after "re-bonds".

Claim 14, line 1: please replace "an" with --a--.

Claim 17, line 3: please replace "chip bond" with --chip-bonding--.

Claim 17, line 4: please replace "chip bond" with --chip-bonding--.

Claim 17, line 4: please delete "be".

Claim 17, line 5: please replace "chip bond" with --chip-bonding--.

Claim 17, line 7: please replace "the chip and the substrate" with --the attached chip with the substrate--.

Claim 17, line 7: please replace "chip bond" with --chip-bonding--.

Claim 17, line 9: please replace "chip bond" with --chip-bonding--.

Claim 17, line 10: please replace "into" with --it to--.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation in line 12 recites “forming a molding compound on the chip-attaching surface of the substrate”. The molding compound is formed over the electrically-connected chip which is on the chip-attaching surface of the substrate, so that the packing pressure will convert the B-stage film to a C-stage film. This rejection may be overcome by rewriting the limitation to recite: --forming a molding compound over the electrically-connected chip on the chip-attaching surface of the substrate--.

5. Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation in line 5 recites “attaching a chip to the chip-attaching surface of the substrate by the [chip-bonding] material”. This is unclear as “by the chip-bonding material” could mean next to the bonding material, not in the bonding material which is used as an adhesive. This rejection may be overcome by rewriting the limitation to recite: --attaching a chip to the chip-attaching surface of the substrate using the [chip-bonding] material as an adhesive--.

6. Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation in line 9 recites "forming a molding compound and fully curing the chip-bonding material on the substrate". The molding compound is formed over the electrically-connected chip on the substrate, fully curing the B-stage film to a C-stage film. This rejection may be overcome by rewriting the limitation to recite: -- forming a molding compound over the electrically-connected chip and fully curing the chip-bonding material on the substrate--.

***Claim Rejections - 35 USC § 102***

7. Claims 17 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin et al, US Patent No. 6,689,638.

The applied reference has a common assignee and inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

In regards to Claim 17:

*A process for making an integrated circuit package comprising: providing a substrate having a chip-attaching surface;*

Column 2, lines 64-68: As shown in FIG. 3, the embodiment in accordance with the present invention comprises a first step in which a substrate 110 is provided with an upper surface 111, an underside 112, and openings 113 which connects the both.

*printing a [chip- bonding material] on the chip-attaching surface of the substrate;*

Column 3, lines 7-11: Thereafter, a layer of "two-stage thermosetting mixture with solvent" 130 is coated on the upper surface 111 of the substrate 110. The "two-stage thermosetting mixture with solvent" 130 comprises thermosetting resin and solvent which could dissolve the thermosetting resin.

Column 3, lines 16-23: The two-stage thermosetting mixture with solvent has the A-stage characteristic while coating on the substrate 110. While coating the mixture 130 is in liquid or glue phase and so it is easy to spread on the upper surface 111 of the substrate 110, therefore it could be formed on the upper surface 111 of the substrate 110 not only by stenciling, but also by painting, printing, spraying, spin-coating, or dipping.

*partially curing the [chip-bonding] material on the substrate to be B-stage;*

Column 3, lines 23-29: Thereafter, the substrate 110 is heated at a predetermined degree [around 90 to 150 degrees in Celsius] to remove the solvent from the mixture 130, and the thermosetting mixture 130 becomes a dry adhesive film 131. It is preferable to conduct another vacuum drying to totally remove the solvent. At this time, the dry adhesive film 131 on the substrate 110 has the B-stage characteristic.

*attaching a chip to the chip-attaching surface of the substrate by the [chip-bonding] material;*

Column 3, lines 35-47: At least a chip 120 is provided subsequently with an active surface 121 and a plurality of bonding pads 122 on the active surface 121. Wherein the active surface 121 of chip 120 is in contact with the upper surface 111 of substrate 110, and the bonding pads 122 are corresponding in location to the openings 113 of substrate 110. In this embodiment, the bonding pads 122 locate on the center position of the active surface 121 of chip 120. Thereafter, the substrate 110 and chip 120 are heated at 180 degrees in Celsius under pressure for few seconds so that the dry adhesive film 131 becomes adhesive to securely combine the chip 120 and the substrate 110 **prior to curing the dry adhesive film 131.**

*electrically connecting the chip and the substrate having the [chip-bonding] material in B-stage;*



Column 3, lines 50-52: The bonding pads 122 of chip 120 are then electrically connect to the substrate 110 with metal bonding wires 140 by wire-bonding via the openings 113.

*and forming a molding compound and fully curing the [chip-bonding] material on the substrate to transform it to C-stage.*

Column 3, lines 53-58: Finally, a thermosetting encapsulating material 150, is provided on the openings 113 of substrate 110. In this embodiment, the encapsulating material 150 is formed by molding. The encapsulating material 150 seals chip 120, and if desired, a plurality of bonding balls 160 could be implanted on the underside 120 of the substrate 110.

In regards to Claim 18:

*The process in accordance with claim 17, wherein the chip bond material in B-stage has a glass transition temperature (T<sub>g</sub>) higher than -10 °C .*

Column 3, lines 30-31: Preferably, the dry adhesive film 131 has a glass transition temperature (T<sub>g</sub>) more than 40 °C.

***Allowable Subject Matter***

8. The following is a statement of reasons for the indication of allowable subject matter:

There is no available prior art nor obvious motivation to combine elements of prior art which teaches a process for making an integrated circuit package comprising: providing a substrate having a chip-attaching surface; applying an A-stage liquid paste on the chip-attaching surface of the substrate, the A-stage liquid paste including a thermosetting material and a solvent; heating the substrate to remove the solvent of the A-stage liquid paste in a manner that the A-stage liquid paste is transformed into a dry B-stage film layer; attaching a chip to the chip-attaching surface of the substrate by the B-stage film layer, the B-stage film layer being active without being fully cured; electrically connecting the chip with the substrate having the B-stage film layer; and forming a molding compound on the chip-attaching surface of the substrate, a packing pressure for the molding compound being larger than a chip-attaching pressure in a manner that the B-stage film layer re-bonds the chip to improve effective chip-bonding area;

and:

A process for making an integrated circuit package comprising: providing a substrate having a chip-attaching surface; applying an A-stage liquid paste on the chip-attaching surface of the substrate; heating the substrate to transform the A-stage liquid paste into a B-stage film layer, the B-stage film layer having a glass transition temperature ( $T_g$ ); attaching a chip to the chip-attaching surface of the substrate, the substrate being heated higher than the glass transition temperature ( $T_g$ ) of the B-

stage film layer to make the B-stage film layer adhere to the substrate and the chip, with the B-stage film layer being active without being fully cured; electrically connecting the attached chip to the substrate having the B-stage film layer; and forming a molding compound over the electrically-connected chip on the chip-attaching surface of the substrate, a packing pressure for the molding compound being larger than a chip-attaching pressure in a manner that the B-stage film layer re-bonds to the chip to improve effective chip-bonding area.

9. Claims 1-16 would be allowable if rewritten to overcome all objections and the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim (if any) and any intervening claims.

10. The following prior art, which is considered pertinent to applicant's disclosure although not relied upon, includes "Process for Producing Semiconductor Device" by Akutsu and "Polybutadiene-Epoxy-Anhydride Laminating Resins" by Zussman.

### *Conclusion*

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Beth E. Owens, Ph.D., whose telephone number is 571.272.1882 and fax number for unofficial communications is 571.273.1882.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms, can be reached on 571.272.1869. The fax phone number for the organization where this application or proceeding is assigned is 703.872.9306 for official communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571.272.2800.

BEO

BEO 10.01.04

  
RICHARD ELMS  
SUPERVISORY PATENT EXAMINER  
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